CLAIMS

What is claimed is:

1. A manufacturing method for a material with a surface nanometer functional structure, which comprises the steps of:

(a) providing a substrate and placing it in a high-pressure container;

(b) supplying a supercritical fluid into the high-pressure container;

(c) tuning the temperature and pressure inside the high-pressure container to their appropriate values;

(d) supplying a precursor of a target material to be formed with a surface nanometer functional structure to the high-pressure container; and

(e) releasing the pressure inside the high-pressure container after the fluid therein reaches its reaction balance point, bringing the precursor to adhere on the substrate surface to form the surface nanometer functional structure.

2. The manufacturing method of claim 1, wherein the supercritical fluid is carbon dioxide supercritical fluid.

3. The manufacturing method of claim 1, wherein the supercritical fluid is selected from the group consisting of NH_3, H_2O, N_2O, methanol, CO_2.

4. The manufacturing method of claim 1 further comprising the step of performing a subsequent processing procedure on the surface nanometer functional structure on the substrate surface to enhance its functions.

5. The manufacturing method of claim 1, wherein the subsequent processing procedure is selected from a vapor-liquid-solid (VLS) growth method and thermal processing on the surface nanometer functional structure.

6. The manufacturing method of claim 1, wherein the substrate is selected from the group consisting of inorganic substrates, polymer substrates, inorganic powders, and polymer powders.

7. The manufacturing method of claim 1, wherein the surface of the substrate has combinations of micrometer-scale holes, nanometer-scale holes, and irregular surface structure.

8. The manufacturing method of claim 1, wherein the precursor is made from a compound selected from the group consisting of alcohol compounds, acetates, resins, or 2-ethyl-hexanoic acid compounds of the target material diluted with a solution.

9. The manufacturing method of claim 8, wherein the solution is selected from the group consisting of methanol, acetone, capric acid, 2-ethyl-hexanoic acid, ethanol, and propanol when the precursor is in the group consisting of alcohols and acetates of the target material.

10. The manufacturing method of claim 8, wherein the solution is selected from the group consisting of 2-ethyl-hexanoic acid and diphenylmethane when the precursor is in the group consisting of resins and 2-ethyl-hexanoic acid compounds.

11. The manufacturing method of claim 1, wherein the precursor is made by the acetone compounds of the target material diluted by an acetone solution.

12. The manufacturing method of claim 1, wherein the precursor is a solution of mixed nanoparticles and an interface activator.

13. The manufacturing method of claim 1 further comprising the step of forming a plurality of catalyzing growth points on the inorganic nanowire surface by supplying a catalyst precursor into the high-pressure container before step (d).

14. The manufacturing method of claim 1 further comprising the step of repeating steps (b) to (e) after step (e) to form a multi-layer compound surface nanometer functional

structure.

15. The manufacturing method of claim 1, wherein the surface nanometer functional structure includes a plurality of micro nanowires.

16. The manufacturing method of claim 1, wherein the nanometer functional structure includes a plurality of nanodots.

17. The manufacturing method of claim 1, wherein the surface nanometer functional structure is a homogeneous functional layer.

18. The manufacturing method of claim 17, wherein the functional layer is a molecule self-assembling reaction layer.

19. The manufacturing method of claim 1, wherein the material of the surface nanometer functional structure is selected from the group consisting of organic molecules, metal oxides, non-metal oxides, and metals.

20. A material with a surface nanometer functional structure comprising:

a substrate; and

more than one layer of surface nanometer functional structure formed on the substrate surface.

21. The material of claim 20, wherein the substrate is a nanometer material with an ultrahigh surface area to volume ratio.

22. The material of claim 20, wherein the surface nanometer functional structure includes a plurality of micro nanowires.

23. The material of claim 20, wherein the surface nanometer functional structure includes a plurality of nanodots.

24. The material of claim 20, wherein the surface nanometer functional structure is a homogeneous functional layer.

25. The material of claim 24, wherein the functional later is a molecule self-assembling reaction layer.

26. The material of claim 20, wherein the material of the surface nanometer functional structure is selected from the group consisting of organic molecules, metal oxides, non-metal oxides, and metals.

27. A one-dimensional nanometer material with a surface nanometer functional structure, which comprises:

a nanowire; and

more than one layer of surface nanometer functional structure formed on the substrate surface.

28. The material of claim 27, wherein the surface nanometer functional structure includes a plurality of micro nanowires.

29. The material of claim 27, wherein the surface nanometer functional structure includes a plurality of nanodots.

30. The material of claim 27, wherein the surface nanometer functional structure is a homogeneous functional layer.

31. The material of claim 27, wherein the material of the surface nanometer functional structure is selected from the group consisting of organic molecules, metal oxides, non-metal oxides, and metals.